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Successful PLM Programs

Maximizing Business Value through a Phased PLM Strategy

Introduction

Product Lifecycle Management (PLM) is a business strategy that is steadily gaining wide acceptance. Companies that took an early adopter approach to PLM are beginning to show significant reductions in new product introduction lead times, benefit from meaningful cost savings and enjoy more profitable products. These companies have adopted best business practices and implemented enabling software tools to make tangible changes in their business. The results from the early pioneers confirm the business value of the PLM concept in helping companies achieve and profit from product innovation.

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PLM is rapidly moving from the pioneer stage to more general acceptance. PLM success stories are coming to light from large, multi-national companies and from smaller businesses alike. Achievements are being unveiled from companies with large, sophisticated supply chains and from those with less complex landscapes. What is interesting about emerging PLM successes is how different many of the stories are from one another—even those from companies in the same industry. This is because many companies have adopted an incremental approach to implementing PLM and are targeting their projects at solving tangible problems with short-term paybacks for their particular business. This pragmatic approach to achieving value from PLM initiatives—The PLM Program—is providing solid, incremental returns to companies that have adopted it. Companies that have a successful PLM Program have found that in addition to solving real business challenges, their PLM investment has provided a solid platform on which to base additional product and process improvement initiatives.

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This white paper introduces the concept of The PLM Program and discusses the characteristics of a successful approach to help manufacturers define their PLM strategy and meet their PLM objectives. The paper also provides some compelling business objectives to consider for early PLM projects or proofs of concept to provide input to the strategic planning process. Finally, the paper highlights some successful PLM Programs initiated by manufacturers that have started down the path to incremental, valuable business improvements on the way to achieving the greater strategic value available from PLM.

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An Incremental Approach to Strategic Value

Some companies—Boeing for example—have committed to major, bold and aggressive PLM projects while others have taken a phased approach to PLM, investing in more focused projects with tangible, high value returns. This incremental approach has been applied not just to PLM initiatives, but to most types of information technology-related projects. The "pragmatic" approach potentially evolved from a combination of poor economic conditions and increasing frustration with low return on investment (ROI) software investments. Unless they were mandatory for security or regulatory purposes, manufacturers chose to pursue only projects with clear objectives and a reasonable scope. Now that the economic climate is improving, companies are also looking for ways to become more innovative and grow the top line. These same companies are, however, continuing to implement projects using this more rational approach to ensure that they are achieving value from their IT and process improvement investments.

Some companies—Boeing for example—have committed to major, bold and aggressive PLM projects while others have taken a phased approach to PLM

PLM is very well suited to this new approach to IT implementation because it can be implemented incrementally, so that each step pays for the next. These projects, however, should not be viewed simply as standalone projects. The phased PLM projects must be viewed as part of an overall PLM initiative to ensure that these small projects lead to large, strategic results.

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A recent review of SMARTEAM customers provides some compelling examples of successful PLM Programs. One customer, BorgWarner, manufacturers a variety of cooling solutions for the automotive and heavy trucking market. BorgWarner's PLM implementation provides an excellent example of tangible projects that include not only information sharing and managing design revisions, but also design collaboration and enhanced engineering change processes that have cut the cycle time for changes "*incredibly*." Randy Schwan, manager global release & change management for BorgWarner Emissions/Thermal Systems, explained that they developed a detailed list of prioritized goals and a defined scope for their project.

The intent of the structured approach was to ensure that the implementation stayed focused on getting the appropriate things accomplished to achieve an ROI. According to Schwan, BorgWarner's goals were:

1 – Allow users to view any drawing, anywhere in the world, even if they could only access the system via a web browser
2 – Be able to print any of these drawings
3 – Provide workflow for engineering changes via e-mail, associating the engineering change documents with the appropriate drawings
4 – Enforce strict revision control
5 – Eliminate hard copies of drawings and eliminate microfilms to save costs
6 – Enable markup of drawings electronically, allowing attachment to engineering work request and workflow

BorgWarner developed clear goals that would offer significant improvements to their business. Interestingly, their project was justified simply based on improving the ease of part search and retrieval. "*If each engineer spends four hours looking for information that could be made available at their fingertips with PLM, we would pay for the system in 12 months by improving efficiency alone,*" said Mr. Schwan.

The PLM Program

Companies should develop a PLM Program in order to achieve their product lifecycle goals and objectives with maximum return and minimal risk. The PLM Program should be laid out as a series of highly valuable, sequenced projects of reasonable scope, each of which provides ROI within a short period of time. When viewed as a whole, these projects should form a strategic program that provides the company with highly valuable benefits while at the same time allows them to initiate the program with incremental, small investments and minimal risk. Individual projects within the PLM Program should be prioritized and sequenced based on the project's ability to achieve results in a short period of time while supporting the later steps in the program. When defining their PLM Program, companies should prioritize projects that provide the highest return achievable within a relatively short project window, perhaps as short as six months long, in order to prove value and build momentum.

The PLM Program should be laid out as a series of highly valuable, sequenced projects of reasonable scope, each of which provides ROI within a short period of time

Viewing PLM as a series of valuable projects breaks up the decision-making process—not to mention the investment—into a more manageable size. This approach is similar to using stages and gates in product development, ensuring that projects don't stray too far from intended goals and validating that project goals are being met along the way so no big surprises appear at the end of the program. Another reason for smaller, incremental projects is that businesses change rapidly. A series of short-term projects allows much more flexibility to respond to customer needs and avoids finishing a project only to find that it doesn't support the current state of the business. Swagelok is a major developer and manufacturer of fluid system component technology. Jim Stewart, engineering systems manager at Swagelok, describes the continuous improvement efforts and the benefits of a flexible PLM program. "*No process or technology is sacred*," said Mr. Stewart, "*The pace of change is tremendous and our ability to respond to it is fundamental to our ability to compete. We want to not only manage this process but, with SMARTEAM's help, become a leader in supporting our customer's needs*."

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Perhaps one of the overriding reasons to phase PLM implementations is to reduce risk. One of the key risks in any enterprise software implementation is managing the impact of change on the people and the business. Midrex Technologies, Inc. is an international process engineering and technology company that has implemented a PLM system that gives them "*a competitive advantage in a global market, so we can sustain our leadership position*." Dan Sanford, vice president of operations for Midrex, describes the strategy behind their PLM Program. "*We adopted a phased approach to help gradually move the change forward without creating too much resistance*," Mr. Sanford explained.

"Building up a Product Lifecycle Management system can only happen in small stages. Employee acceptance is extremely important because staff have to change their procedure"
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Roland Weidmann of Kässbohrer, a leading manufacturer of all-terrain vehicles for ski slope preparation and beach cleaning, stated the approach more emphatically: "*Building up a Product Lifecycle Management system can only happen in small stages. Employee acceptance is extremely important because staff have to change their procedures, and they should not be over-taxed*." Mr. Weidmann went on to explain that their implementation had been a "*great success*," with more processes now running on the system and the ability to communicate much more efficiently and effectively with one another.

Appropriate phasing of the PLM Program can help ensure that project goals are met, that PLM investments provide tangible returns, and that the risk of project failure and user resistance is minimized. Of course, there is more then one approach to choosing and phasing incremental projects for a PLM Program. Common phasing strategies include phasing by business improvement opportunity, by geographic location, or by organizational entity.

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Potential PLM Projects – Phasing by Business Improvement

Phasing the PLM Program by business improvement opportunities relies on finding tangible problems in the business. Good candidate projects to address must be current problem areas in the business that have a good chance of being solved within the project timeframe. PLM can provide a broad range of capabilities to improve business, but requires focus in order to reach full potential. "*Don't tackle it all at once,*" said Mr. Sanford of Midrex, "*PLM packages are very customizable in structure. You should get the software implemented and then learn as you go*."

"Don't tackle it all at once, PLM packages are very customizable in structure. You should get the software implemented and then learn as you go"
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As you would expect, different companies have different priorities for PLM. Miki Pulley, a comprehensive manufacturer of motion control and power transmission equipment, used SMARTEAM to change their requirement specification exchange process. Hirohide Hirayama, of Miki Pulley's technical system group, describes that requirement specification is developed during final discussion with a customer before a contract is put in place, and that this is the first and most important activity throughout whole design process. "*In product development, the most important decision is made in requirement specification, which is located most upper-stream in the business. Therefore, clear definition and a firm concept are indispensable in this process. It has big implications for down-stream processes*."

Based on the needs of their business, Miki Pulley started their PLM implementation with requirements, but that does not mean that all manufacturers should focus there first. There are a number of high-return projects that should be considered for inclusion in the PLM Program. The following examples provide excellent candidate projects to be sequenced based on the individual company and their objectives. These projects are intended to provide a valuable return to the business in a short period of time.

Different companies have different priorities for PLM

Product Data Organization and Retrieval

The fist improvement opportunity that we will look at is organization, control and accessibility of product and design information. Sometimes referred to as "*Product Data Management*" or "*PDM,*" this focus on product knowledge is a fundamental requirement of PLM. A base level of control is required for product data, and simply understanding product structures and Computer Aided Design (CAD) data can be a tremendous challenge for some companies. Without this control, companies don't have a foundation on which to layer more advanced PLM business processes. From an outside perspective, some people may assume that most manufacturers today have well-managed design data, even if they do not have a full view of product data that is generated outside of Engineering. Unfortunately, many companies still struggle with mismanaged design data and suffer from related repercussions, including the inability to find current design revisions, people working on obsolete designs and duplicated work. The challenge for many of these companies is to effectively manage and share multiple types of information—including structured CAD data and non-CAD oriented information—across departmental and company boundaries. These companies are far from being able to take advantage of making product data and intellectual property accessible to the organization at large, including non-engineering disciplines.

Unfortunately, many companies still struggle with mismanaged design data and suffer from related repercussions, including the inability to find current design revisions, people working on obsolete designs and duplicated work

Some companies may see this objective as a higher priority than others. For example, the number of parts manufactured by Miki Pulley reaches approximately 100,000. They describe this as the key driver of their SMARTEAM implementation. In addition to large or complex part libraries, the use of 3D CAD makes better data management more necessary due to the complexity of the file structures and interrelationships.

Many companies see better data management as critical to the conversion to 3D CAD. "*It was a huge challenge to convert completely to 3D and at the same time start up a PDM system, but we achieved all that within a year*," stated Mr. Weidmann of Kässbohrer. Remote operations are also a key challenge in managing data. Before using SMARTEAM, for example, Midrex reported that they always had to put four to eight people overseas at a project site in order to manage it. The cost driver for their PLM Program was fewer people stationed abroad.

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Not all needs for improved product data organization and retrieval will be the same, either. SMARTEAM customer Invacare is an industry leader in the home medical products market. Invacare has successfully implemented a worldwide PLM system that complies with U.S. Food and Drug Administration (FDA) documentation requirements and also supports global sourcing and procurement. Invacare can now access product design data from any of its facilities in a standard data format, generate design drawings automatically and transmit design data to colleagues, vendors, and suppliers anywhere in the world. For a company like Invacare, product data management across their global supply chain was a core requirement for their PLM Program.

Configuration Management / Change Management

Another key area of focus for PLM Programs can be better management of product configurations and engineering change processes. This process frequently provides an opportunity for improving cycle times, reducing obsolete inventory and improving product quality. This area is often a good starting project for a PLM Program, or follow-up project to product data management. This project typically involves establishing standardized routing and approval processes, usually implemented through workflow and alert capabilities. The project will sometimes leverage industry standards like CMII, which provides a robust methodology for planning, approving and communicating changes.

"SMARTEAM has provided a system for managing, communicating, and integrating technical and business change throughout the organization"
- Jim Stewart, engineering systems manager Swagelok

"*SMARTEAM has provided a system for managing, communicating, and integrating technical and business change throughout the organization*," said Mr. Stewart of Swagelok. According to Swagelok, since deploying SMARTEAM they have tripled their engineering change handling capacity, and reduced order processing lead-time by 70% on make-to-order products. Improving configuration and change management can be a valuable project for many companies and is often a manageable project with clear boundaries. Like product organization and retrieval, a configuration and change management project also provides a solid foundation for future improvements.

Innovation and Process Improvement (Stages and Gates)

Another potential area for initial investment is providing much-needed focus to the product innovation process. Many companies suffer from attempting to execute more product innovation projects at one time than their capacity will allow. One approach to solving this problem is to reduce the number of projects by focusing on the ones that will provide the best value to the business. Many companies approach this problem by implementing a disciplined approach to managing product and project portfolios.

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- Luis Cediel, vice president of R&D at Habasit

Another way to improve the problem of capacity overload is to improve the throughput of the product innovation process itself. Project management automation helps ensure that projects run efficiently and participants are aware of expected deadlines and deliverables. Improved project planning and control can help companies complete projects on time and consume less resources. Project management tools and best business practices that incorporate periodic review and approval, or gates, can also provide the company with the ability to better control their innovation projects so they run more efficiently, achieve the intended goals and have significant reductions in rework.

Habasit is a leader in power transmission and conveyor belting that has seen significant gains from better management of product development projects. "*I estimate that since implementing Stage-Gates with SMARTEAM we have shortened product development time 20 to 30%*," said Luis Cediel, vice president of R&D at Habasit. "*We spend less time on re-development and corrections and make faster decisions. One of the main benefits, which we've seen across all projects, has been better definition of a project's target and specifications, validated with customers. We are able to avoid costly re-design and late changes*."

Material Rationalization / Strategic Sourcing

Another problem that many companies suffer from is lack of control of material definitions. Many companies have significant redundancies in the raw materials that they buy because designers don't have an easy way of finding an existing material definition that will work. This lack of control results in redundant inventory, the inability to take advantage of bulk discounts in purchasing and, potentially even stock-out situations in which a perfectly applicable material is sitting in inventory. Specification management and product data management tools with parametric search capabilities can be implemented to allow designers to search existing items before creating new ones. Strategic sourcing initiatives can leverage these common material definitions to take advantage of larger volume purchases for a smaller number of items.

Design Rationalization / Design Reuse

Another project that takes advantage of the common material definitions from rationalizing materials is a systematic review of existing designs to determine whether duplicate designs can be rationalized and find opportunities to replace materials with less expensive alternatives. In addition, standardization of designs enables more rapid development of similar designs when designing new products. This project is an excellent candidate for a later stage project that can heavily leverage a previous PLM investment in product data organization.

Collaborative Design and Concurrent Engineering

Another potential PLM initiative is reducing time to market by improving the effectiveness of the design process. Some of the potential projects above will likely reduce new product introduction lead-times. Products can be brought to market more rapidly when projects are run efficiently, project leaders don't have to compete with too many other projects for resources, team members can easily access needed data and repeatable processes are in place.

In addition to these savings, many companies have opportunities to shorten the time it takes to bring a product to market by involving other parties in the design process and sharing product information with them. Many design processes are inefficient, don't include all of the right people at the right time and require lengthy design iterations between internal departments, suppliers and customers. By implementing collaborative processes and tools, companies can share product information internally with "*downstream*" parties to ensure that the product can be produced efficiently and at a competitive price.

Midrex set up SMARTEAM across multiple, geographically dispersed sites, to extend collaborative design process across engineering teams and supply chain partners internal and external to the organization. "*The need to collaborate with our offshore engineering partner was the main driver for change*," said Midrex's Sanford, "*We needed real-time replication of data files and Web access to our project database for our distant suppliers, partners and customers*." Mr. Sanford went on to explain that the ability for SMARTEAM to provide nearly real-time database and file synchronization was critical due to the number and size of files for a project. "*If we had to pull documents down, we would spend a lot of hours just sitting there*," Mr. Sanford explained. "*It was simply not feasible without replication.*"

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Implementing collaborative design may be broken down into several projects. A company may decide to focus on involving suppliers in the design process first before involving customers. Alternatively, they may first focus on involving all internal departments in the design process. While some companies may benefit the most simply by putting internal cross-functional design teams in place, others may see higher benefit in involving suppliers or customers in their product designs.

Potential PLM Projects – Phasing by Organization

Another approach to phasing a PLM Program is rolling out the implementation by functional area, geography or business unit. This approach allows for lessons learned in one area to be applied to future projects, in addition to the benefits already discussed for phased implementations. William Gurley, engineering project manager at Swagelok, explains that they started out with a few seats and are now expanding the system enterprise-wide incrementally, group by group: "*At each step of the way, we learn more about PLM. This incremental deployment strategy helps to avoid the disruption of launching the technology all at once throughout the enterprise. New users become productive quickly. We see benefits right away instead of waiting months or even years to roll out a company-wide system.*"

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- William Gurley, engineering project manager Swagelok

Randy Schwan of BorgWarner describes their decision to roll out by location. "*We didn't want to implement PDM without workflow—we felt it was not a good idea. We implemented the whole product—including web, markup and workflow—all in one shot*." BorgWarner opted to provide this fuller solution up front, Mr. Schwan explained, and then roll it out by location.

"We implemented the whole product—including web, markup and workflow—all in one shot"
- Randy Schwan, manager global release & change management BorgWarner

Other companies may choose to roll out by location in order to prove the value of PLM before expanding to broader adoption. NSC Schlumberger, for example, implemented PLM in their fiber-to-yarn division. This division designs and manufactures a wide range of industrial machinery that produces yarn from natural or synthetic fibers. The initial PLM implementation included three factories in France and included design, marketing and maintenance departments. Schlumberger expects product development time to improve by 25% and quality errors to decrease. Following this successful implementation, the company plans to extend the PLM solution to the other four subsidiaries of NSC Group.

Unexpected Benefits

By taking an incremental approach to PLM, companies often discover quite a bit about their business and business processes. It is very common to hear that companies found unexpected results and uses for PLM solutions by leveraging a repository of clean, rationalized product information and a solid knowledge management platform. Midrex, for example, uses SMARTEAM as the backbone for ISO 9001 compliance. As Midrex began their implementation, they reviewed workflows, redlining, change management, online reviewing and other capabilities of the PLM solution. "*As we implemented, it became evident to us that it would be a great tool to take care of forms, procedures and approvals required for ISO*," Mr. Sanford recalled. "*It was a learning process—we didn't really buy it for that purpose, but it really helped us get things done quickly*." Mr. Sanford added that electronic tracking and easy retrieval of information make the audits run much more smoothly. Midrex did not buy a quality management system—nor base their PLM ROI on it—but found additional uses for the tool based on an incremental approach to discovering and realizing the value of PLM.

It is very common to hear that companies found unexpected results and uses for PLM solutions

Swagelok, too, uses SMARTEAM to meet quality systems requirements necessary to adhere to a wide array of regulatory and third-party approvals, including ISO, PED and METI. They aim to continue leveraging SMARTEAM to optimize their product design and quality planning processes by evaluating each process and applying lean, best-practice methodologies.

BorgWarner also reported valuable "*by-products*" of their PLM implementation. For example, by pulling up and sending a PDF or a CAD model to a vendor, the Purchasing department can quickly recognize a pending revision for a part. "*These are tangibles that we didn't even compute, that have paid for the system again,*" says BorgWarner's Randy Schwan.

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Gérard Gaire, director of research and development for NSC Schlumberger, commented on his surprise at the benefits from implementing SMARTEAM in conjunction with CATIA V5. "*The results were beyond what we had hoped for. We now want to obtain similar results in our four subsidiaries. To achieve this, we intend to use collaborative processes and manage the life cycle of our products at all levels, from the initial design through to their maintenance.*"

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Launching the PLM Program

The PLM Program approach has provided significant value to these companies. To achieve true strategic value, the PLM projects should be viewed as business change initiatives rather than simply software implementations. PLM software tools should be deployed to support the new way of doing business and help drive the change into the business, recognizing that software alone does not solve business problems without changing the way that people work.

"*Crucial to the success of SMARTEAM was our design engineers' confidence in the system*," said Kässbohrer's Weidmann. "*Without their acceptance, it would not have been possible to establish a PDM strategy, nor could a PLM strategy have been developed from it. It was important that it should do what it promised. That included its capacity to be stable, have a transparent version management system, with defined responsibilities, a capacity to detect errors and collisions at an early stage, and to speed up the time-to-market*."

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The experience of these companies is evidence that the PLM Program approach is effective. These companies chose projects based on value and sequenced them to gain synergy between projects. In this way, subsequent projects provide more than just a simple additive ROI, and companies can implement the change in a way that gains the confidence of the engineers and other users.

Finally, when embarking on a PLM Program, these companies found a vendor that offered the right software, business expertise and implementation tools. According to the companies researched, SMARTEAM provides companies with comprehensive industry "*best practice*" business processes for implementing PLM in such a way as to further optimize work throughout the lifecycle. These best practices are the result of extensive implementation experience in the field, seeing how many different companies across industries work, and compiling streamlined approaches for implementing the solution in the best way for the most gain. Look for this level of experience in your PLM provider.

Recommendations

- Develop a PLM strategy based on your business strategy
- Develop a program that prioritizes and sequences potential PLM projects
- Include valuable, tangible projects that have relatively short payback in your program
- Sequence the programs to allow later phases to leverage earlier ones
- Look for a vendor that understands your business, and can support your business needs, now and throughout the PLM Program
- Look for a vendor that can provide flexible, modular software and best business practices that can help you achieve the business priorities in your PLM Program

Summary

Swagelok's vice president of engineering and technology, Jim Hanson, summarized the value of PLM nicely. "*PLM is a powerful enabling technology for greater design collaboration within the company*," notes Hanson. "*PLM puts us squarely in the middle of a technology revolution that companies absolutely must utilize to remain competitive in the global market*."

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- Jim Hanson, vice president of engineering and technology Swagelok

The bottom line is that these companies have had early success in implementing PLM strategies. They decided to start small, but planned for a big ROI. The companies researched for this paper indicate that SMARTEAM provided excellent support for their phased PLM Programs. By mapping out their PLM strategies and breaking them down into multiple projects they have been able to quickly internalize new, more effective practices that provide a return to the business. These returns can then be invested in further projects that will provide more incremental value and further the company to realizing its overall PLM goals and associated PLM benefits.

About the Author

Jim Brown has over 15 years of experience in management consulting and application software focused on the manufacturing industries. Jim is a recognized expert in software solutions for manufacturers and has broad experience in applying enterprise applications such as Product Lifecycle Management, Supply Chain Management, ERP, and Customer Relationship Management to improve business performance. Jim began his professional experience at General Electric before joining Andersen Consulting (Accenture), and subsequently served as an executive for software companies specializing in PLM and Process Manufacturing solutions.

Jim is the president of Tech-Clarity, a research and consulting firm dedicated to making the value of technology clear to business, where he is a frequent author and speaker on applying software technology to achieve tangible business benefits. Jim also serves as the PLM Analyst for Technology Evaluation Centers and The PLM Evaluation Center.

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